

MORRIS (R.T.)

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also

Peroxide of hydrogen and Ozone.

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THE NECESSARY PEROXIDE OF HYDROGEN.

Read in the Section of Surgery and Anatomy, at the Forty-first Annual Meeting of the American Medical Association, held at Nashville, Tenn., May, 1890.

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Stop suppuration! That is the duty that is imposed upon us when we fail to prevent suppuration.

As the ferret hunts the rat, so does Peroxide of Hydrogen follow pus to its narrowest hiding place, and the pyogenic and the other micro-organisms are as dead as the rat that the ferret catches when the Peroxide is through with them. Peroxide of Hydrogen, H_2O_2 , in the strong 15-volume solution, is almost as harmless as water; and yet, according to the testimony of Gifford, it kills anthrax spores in a few minutes.

For preventing suppuration we have bichloride of mercury, hydronaphthol, carbolic acid, and many other antiseptics; but for stopping it abruptly, and for sterilizing a suppurating wound, we have only one antiseptic that is generally efficient, so far as I know, and that is the strong Peroxide of Hydrogen.

Therefore I have qualified it, not as "good," not as "useful," but as "necessary." In abscess of the brain, where we could not thoroughly wash the pus out of tortuous canals without injuring the tissues, the H_2O_2 injected at a superficial point will follow the pus, and throw it out, too, in a foaming mixture. It is best to inject a small quantity, wait until foaming ceases, and repeat injections until the last one fails to bubble. Then we know that the pus cavity is chemically clean, as far as live microbes are concerned.

In appendicitis, we can open the abscess, inject Peroxide of Hydrogen, and so thoroughly sterilize the pus cavity that we need not fear infection of the general peritoneal cavity, if we wish to separate intestinal adhesions and remove the appendix vermiformis. Many a patient, who is now dead, could have been saved if Peroxide of Hydrogen had been used when he had appendicitis.

The single means at our disposal allows us to open the most extensive abscess psoas without dread of septic infection following.

In some cases of purulent conjunctivitis, we can build a little wall of wax about the eye, destroy all pus with Peroxide of Hydrogen, and cut the suppuration short. Give the patient ether, if the H_2O_2 causes too much smarting. It is only in the eye, in the nose and in the urethra that Peroxide of Hydrogen will need to be preceded by cocaine (or ether) for the purpose of quieting the smarting, for it is elsewhere almost as bland as water.

It is possible to open a large abscess of the breast, wash it out with H_2O_2 , and have recovery ensue under one antiseptic dressing, without the formation of another drop of pus.

Where cellular tissues are breaking down, and in old sinuses, we are obliged to make repeated applications of the H_2O_2 for many days, and in such cases I usually follow it with balsam of Peru, for balsam of Peru, either in fluid form or used with sterilized oakum, is a most prompt encourager of granulation.

If we apply H_2O_2 on a probang to diphtheritic membranes at intervals of a few moments, they swell up like whipped cream and come away easily, leaving a clean surface. The fluid can be snuffed up into the nose and will render a foetid *ozæna* odorless.



It is unnecessary for me to speak of further indications for its use, because wherever there is pus we should use Peroxide of Hydrogen. We are all familiar with the old law "*Ubi pus, ibi evacua*," and I would change it to read "*Ubi pus, ibi evacua, ibi hydrogenum peroxidum infunde*." That is the rule. The exceptions which prove the rule are easily appreciated when we have them to deal with.

Peroxide of Hydrogen is an unstable compound, and becomes weaker as oxygen is given off, but Marchand's 15-volume solution will retain active germicidal power for many months if kept tightly corked in a cold place. The price of this manufacturer's preparation is about 75c per lb., and it can be obtained from any large drug house in this country. When using the H_2O_2 it should not be allowed to come into contact with metals if we wish to preserve its strength, as oxygen is then given off too rapidly.

H_2O_2 must be used with caution about the hair, if the color of the hair is a matter of importance to the patient; for this drug, under an alias, is the golden hair bleach of the *nymph's despare*, and a dark-haired man with a canary-colored moustache is a stirring object.

PEROXIDE OF HYDROGEN AND OZONE.

THEIR ANTISEPTIC PROPERTIES.

Read before the International Medical Congress, held at Berlin, Germany, on the 7th of August, 1890. Published by *Medical News* of Philadelphia, October 25th, 1890. Pp. 416-418.

By DR. PAUL GIBIER, *Director of the Pasteur Institute of New York.*

GENTLEMEN:

Since the discovery of Peroxide of Hydrogen by Thenard, in 1818, the therapeutic applications of this oxygenated compound seem to have been neglected both by the medical and the surgical professions; and it is only in the last twenty years that a few bacteriologists have demonstrated the germicidal potency of this chemical.

Among the most elaborate reports on the use of this compound may be mentioned those of Paul Bert and Regnard, Baldy, Péan and Larrivé.

Dr. Miguel places Peroxide of Hydrogen at the head of a long list of antiseptics, and close to the silver salts.

Dr. Bouchut has demonstrated the antiseptic action of Peroxide of Hydrogen, when applied to diphtheritic exudations.

Prof. Nocard, of Alfort, attenuates the virulence of the microbe symptomatic of carbuncle, before he destroys it, by using the same antiseptic.

Dr. E. R. Squibb,¹ of Brooklyn, has also reported the satisfactory results which he obtained with Peroxide of Hydrogen in the treatment of infectious diseases.

Although the above-mentioned scientists have demonstrated by their experiments that Peroxide of Hydrogen is one of the most powerful destroyers of pathogenic microbes, its use in therapeutics has not been as extensive as it deserves to be.

In my opinion the reason for its not being in universal use is the difficulty of procuring it free from hurtful impurities. Another objection is the unstableness of the compound, which gives off nascent oxygen when brought in contact with organic substances.²

¹ *Gaillard's Medical Journal*, March, 1889.

² The Peroxide of Hydrogen that I use is manufactured by Mr. Charles Marchand, of New York. This preparation is remarkable for its uniformity in strength, purity and stability.

Besides the foregoing objections the surgical instruments decompose the peroxide, hence, if an operation is to be performed, the surgeon uses some other antiseptic during the procedure, and is apt to continue the application of the same antiseptic in the subsequent dressings.

Nevertheless, the satisfactory results which I have obtained at the Pasteur Institute of New York with Peroxide of Hydrogen, in the treatment of wounds resulting from deep bites, and those which I have observed at the French clinic of New York, in the treatment of phagedenic chancres, varicose ulcers, parasitic diseases of the skin, and also in the treatment of other affections caused by germs, justify me in adding my statement as to the value of the drug.

But, it is not from a clinical standpoint that I now direct attention to the antiseptic value of Peroxide of Hydrogen. What I now wish is merely to give a full report of the experiments which I have made on the effects of Peroxide of Hydrogen upon cultures of the following species of pathogenic microbes: *Bacillus anthracis*, *bacillus pyocyaneus*, the bacilli of typhoid fever, of Asiatic cholera, and of yellow fever, *streptococcus pyogenes*, *micro-bacillus prodigiosus*, *bacillus megaterium*, and the bacillus of osteomyelitis.

The Peroxide of Hydrogen which I used was a 3.2% solution, yielding fifteen times its volume of Oxygen; but this strength was reduced to about 1.5%, corresponding to about eight volumes of Oxygen, by adding the fresh culture containing the microbe upon which I was experimenting. I have also experimented upon old cultures loaded with a large number of the spores of the *bacillus anthracis*. In all cases my experiments were made with a few cubic centimetres of culture in sterilized test-tubes, in order to obtain accurate results.

The destructive action of Peroxide of Hydrogen, even diluted in the above proportions, is almost instantaneous. After a contact of a few minutes, I have tried to cultivate the microbes which were submitted to the peroxide, but unsuccessfully, owing to the fact that the germs had been completely destroyed.

My next experiments were made on the hydrophobic virus in the following manner:

I mixed with sterilized water a small quantity of the medulla taken from a rabbit that had died of hydrophobia, and to this mixture added a small quantity of Peroxide of Hydrogen. Abundant effervescence took place, and, as soon as it ceased, having previously trephined a rabbit, I injected a large dose of the mixture under the dura mater. Slight effervescence immediately took place and lasted a few moments, but the animal was not more disturbed than when an injection of the ordinary virus is given. This rabbit is still alive, two months after the inoculation.

A second rabbit was inoculated with the same hydrophobic virus which had not been submitted to the action of the peroxide, and this animal died at the expiration of the eleventh day with the symptoms of hydrophobia.

I am now experimenting in the same manner upon the *bacillus tuberculosis*, and if I am not deceived in my expectation, I will be able to impart to the profession some interesting results.

It is worthy of notice that water charged, under pressure, with fifteen times its volume of pure oxygen has not the antiseptic properties of Peroxide of Hydrogen. This is due to the fact that when the peroxide is decomposed nascent oxygen separates in that most active and potent of its conditions next to the condition, or allotropic form, known as "Ozone." Therefore it is not illogical to conclude that ozone is the active element of Peroxide of Hydrogen.

Although Peroxide of Hydrogen decomposes rapidly in the presence of organic substances, I have observed that its decomposition is checked to some extent by the addition of a sufficient quantity of glycerin; such a mixture, however, cannot be kept

for a long time, owing to the slow but constant formation of secondary products having irritating properties.

Before concluding I wish to call attention to a new oxygenated compound, or rather ozonized compound, which has been recently discovered and called "Glycozone" by Mr. Marchand.

This Glycozone results from the reaction which takes place when glycerin is exposed to the action of ozone under pressure—one volume of glycerin with fifteen volumes of ozone produces Glycozone.

By submitting the bacillus anthracis, pyocyanus, prodigiosus, and megaterium to the action of Glycozone, they were almost immediately destroyed.

I have observed that the action of Glycozone upon the typhoid fever bacillus, and some other germs, is much slower than the influence of Peroxide of Hydrogen.

In the dressing of wounds, ulcers, etc., the antiseptic influence of Glycozone is rather slow if compared with that of Peroxide of Hydrogen, with which it may, however, be mixed at the time of using.

It has been demonstrated in Pasteur's laboratory that glycerin has no appreciable antiseptic influence upon the virus of hydrophobia; therefore, I mixed the virus of hydrophobia with glycerin, and at the expiration of several weeks all the animals which I inoculated with this mixture died with the symptoms of hydrophobia.

On the contrary, when glycerin has been combined with ozone to form Glycozone, the compound destroys the hydrophobic virus almost instantaneously.

Two months ago, a rabbit was inoculated with the hydrophobic virus, which had been submitted to the action of this new compound, and the animal is still alive.

I believe that the practitioner will meet with very satisfactory results with the use of Peroxide of Hydrogen for the following reasons:

1. This chemical seems to have no injurious effect upon animal cells.
2. It has a very energetic destructive action upon vegetable cells—microbes.
3. It has no toxic properties; five cubic centimetres injected beneath the skin of a guinea-pig do not produce any serious result, and it is also harmless when given by the mouth.

As an immediate conclusion resulting from my experiments, my opinion is, that Peroxide of Hydrogen should be used in the treatment of diseases caused by germs, if the microbial element is directly accessible; and it is particularly useful in the treatment of infectious diseases of the throat and mouth.

